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IN THE CLAIMS

1. (Currently Amended) An apparatus comprising:

an electrochemical cell electrically conductive support comprising

an electrically and thermally conductive core comprising an active area and a heat transfer area extending beyond the active area; and

an electrically and thermally conductive polymeric composite substantially covering the active area of the conductive core but not the heat transfer area.

2. (Previously Presented) The apparatus according to Claim 1, wherein the electrically and thermally conductive core comprises a metal or metal alloy.

3. (Previously Presented) The apparatus according to Claim 2, wherein the metal or metal alloy is selected from the group consisting of aluminum, copper, magnesium, and combinations thereof.

4. (Previously Presented) The apparatus according to Claim 1, wherein the electrochemical cell electrically conductive support additionally comprises at least one channel for conducting a fluid.

5. (Previously Presented) The apparatus according to Claim 4, wherein the at least one channel is an exterior channel for conducting a fuel gas, a fuel liquid, an oxidant gas, or an oxidant liquid.

6. (Previously Presented) The apparatus according to Claim 4, wherein the at least one channel is an interior channel for conducting a cooling fluid.

7. (Cancelled)

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8. (Previously presented) The apparatus according to Claim 1, wherein the heat transfer area is in the form of a cooling fin.

9. (Previously Presented) The apparatus according to Claim 1, wherein a thermal coefficient of expansion of the conductive core is substantially the same as a thermal coefficient of expansion of the electrically and thermally conductive polymeric composite, over an operative temperature range of the electrochemical cell.

10. (Previously Presented) The apparatus according to Claim 1, wherein a volume resistivity of the electrochemical cell electrically conductive support is less than about 0.5000 ohm-cm.

11. (Currently Amended) A system comprising:

a plurality of electrochemical cell electrically conductive supports supporting a plurality of fuel cell membranes, wherein at least one of the supports comprises:

an electrically and thermally conductive core comprising an active area and a heat transfer area extending beyond the active area; and

an electrically and thermally conductive polymer composite substantially covering the active area of the conductive core but not the heat transfer area;

a gas supply means for supplying fuel gases and oxidant gases to the fuel cell membranes;

an electrical means for transporting electrical charge to and from the plurality of fuel cell membranes;

an electrical means for conditioning power produced by the plurality of fuel cell membranes; and

a control means for controlling the fuel gases, oxidant gases, and electrical means.

12. (Previously Presented) The system according to Claim 11, wherein at least one of the plurality of electrochemical cell electrically conductive supports has an interior channel for channeling a cooling fluid.

13. (Previously Presented) The system according to Claim 12, further comprising means for supplying the cooling fluid to the interior channel.

14. (Cancelled)

15. (Previously Presented) The system according to Claim 11, further comprising a means for supplying a cooling fluid to the heat transfer area.

16. (Previously Presented) The system according to Claim 15, wherein the cooling fluid is air.

17. (Previously Presented) An apparatus, comprising

an electrochemical cell electrically conductive support comprising

an electrically and thermally conductive core comprising an active area and a heat transfer area extending beyond the active area; and

an electrically and thermally conductive polymeric composite substantially covering the active area and adhered thereto by an adhesion promoter.

18. (Original) The apparatus of Claim 17, wherein the adhesion promoter is a silane, titanate, or zirconate adhesion promoter.

19. (Previously Presented) The apparatus of Claim 17, wherein the conductive polymeric composite comprises an electrically conductive filler, wherein all or part of the electrically conductive filler is in the form of fibers, platelets, or a combination of fibers and platelets.

20. (Original) The apparatus of Claim 17, wherein the conductive support has a volume resistivity of about 0.116 ohm-cm or less.

21. (Original) The apparatus of Claim 17, wherein the conductive support has a thermal conductivity of at least about 5 watts/meter °K.

22. (Previously Presented) The apparatus of Claim 17, wherein the conductive polymeric composite, when molded, has a linear shrinkage per unit length of the molded conductive polymeric composite in the X-Y plane of less than or equal to about 0.005.

23. (Original) The apparatus of Claim 17, wherein the conductive core comprises metals selected from the group consisting of aluminum, aluminum alloys, nickel, nickel alloys, copper, platinum, magnesium, magnesium alloys, titanium, gold plated metals, and stainless steel.

24. (Previously Presented) The apparatus of Claim 23, wherein the conductive polymeric composite is a polybutadiene- or polyisoprene-based composite.

25. (Previously Presented) The apparatus of Claim 24, wherein the adhesion promoter is chemically bonded with both the conductive core and the polybutadiene- or polyisoprene-based composite.

26. (Original) The apparatus of Claim 24, wherein the adhesion promoter is a mercapto-functional silane or vinyl silane.

27. (Previously Presented) The apparatus of Claim 24, wherein the conductive polybutadiene- or polyisoprene-based composite comprises an electrically conductive filler, a thermosetting polybutadiene or polyisoprene resin and an unsaturated butadiene- or isoprene-containing polymer capable of participating in cross-linking with the polybutadiene or polyisoprene resin during cure, and further wherein a volume to volume ratio of the polybutadiene or polyisoprene resin to the unsaturated butadiene- or isoprene-containing polymer is between 1:9 and 9:1, inclusive.

28. (Original) The apparatus of Claim 27, wherein the conductive polybutadiene- or polyisoprene-based composite further comprises a functionalized liquid polybutadiene or polyisoprene resin.

29. (Previously Presented) The apparatus of Claim 27, wherein the conductive polybutadiene- or polyisoprene-based composite comprises, based on a total volume of the composite, about 10 volume % to about 90 volume % of the electrically conductive filler.

30. (Original) The apparatus of Claim 27, wherein the filler is synthetic graphite.

31. (Original) The apparatus of Claim 27, wherein the conductive polybutadiene-or polyisoprene-based composite further comprises at least one monomer with vinyl unsaturation.

32. (Original) The apparatus of Claim 31, wherein the at least one monomer with vinyl unsaturation is selected from the group consisting of styrene, vinyl toluene, divinyl benzene, triallylcyanurate, diallylphthalate, and multifunctional acrylate monomers.

33. (Original) The apparatus of Claim 27, wherein the unsaturated butadiene- or isoprene-containing polymer is a copolymer of isoprene or butadiene and a second monomer.

34. (Previously Presented) The apparatus of Claim 33, wherein the unsaturated butadiene- or isoprene-containing copolymer is a solid.

35. (Original) The apparatus of Claim 33, wherein the unsaturated butadiene- or isoprene-containing polymer is a block copolymer.

36. (Previously Presented) The apparatus of Claim 35, wherein the unsaturated butadiene- or isoprene-containing polymer is a styrene-butadiene or a methyl styrene-butadiene di-block polymer.

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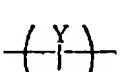
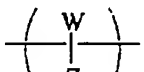
37. (Previously Presented) The apparatus of Claim 35, wherein the unsaturated butadiene- or isoprene-containing polymer is a thermoplastic elastomer block copolymer having one of the formula

$X_m(Y\text{-}X)_n$,  , $W_p\text{-}(Z\text{-}W)_q$, or 

wherein in each formula Y is a block comprising isoprene or butadiene units; X is a thermoplastic block; m and n represent the average block numbers in the copolymer, m being 0 or 1, and n being at least 1; Z is a polyethylene or ethylene-propylene copolymer block; W is a thermoplastic block; and p and q represent the average block members in the copolymer, p being 0 or 1, and q being at least 1.

38. (Previously Presented) The apparatus of Claim 24, wherein the polybutadiene or polyisoprene has a molecular weight of less than 5,000.

39. (Previously Presented) The apparatus of Claim 23, wherein the conductive polymeric composite comprises an epoxidized phenol novolac resin, an epoxidized cresol novolac resin, polymers based on unsaturated vinyl esters, and combinations comprising at least one of the foregoing resins.

40. (Previously Presented) An electrochemical cell component comprising

an electrically and thermally conductive core comprising an active area and a heat transfer area extending beyond the active area; and

an electrically and thermally conductive polymer composite substantially covering and adhered to the active area of the conductive core by an adhesion promoter, wherein the electrochemical cell component has a volume resistivity of about 0.116 ohm-cm or less.

41. (Original) The component of Claim 40, wherein the adhesion promoter is a silane, titanate, or zirconate adhesion promoter.

42. (Previously Presented) The component of Claim 40, wherein the conductive polymer composite comprises an electrically conductive filler and all or part of the electrically conductive filler is in the form of fibers, platelets, or a combination of fibers and platelets.

43. (Previously Presented) The component of Claim 40, wherein the electrochemical cell component has a thermal conductivity of at least about 5 watts/meter °K.

44. (Previously Presented) The component of Claim 40, wherein the conductive polymer composite, when molded, has a linear shrinkage per unit length of the molded conductive polymer composite in the X-Y plane of less than or equal to about 0.005.

45. (Original) The component of Claim 40, wherein the conductive core comprises metals selected from the group consisting of aluminum, aluminum alloys, nickel, nickel alloys, copper, platinum, magnesium, magnesium alloys, titanium, gold plated metals, and stainless steel.

46. (Original) The component of Claim 45, wherein the conductive polymer composite is a polybutadiene- or polyisoprene-based composite.

47. (Original) The component of Claim 46, wherein the adhesion promoter is chemically bonded with both the conductive core and the conductive polybutadiene- or polyisoprene-based composite.

48. (Original) The component of Claim 46, wherein the adhesion promoter is a mercapto-functional silane or vinyl silane.

49. (Previously Presented) The component of Claim 46, wherein the conductive polybutadiene- or polyisoprene-based composite comprises an electrically conductive filler, a thermosetting polybutadiene or polyisoprene resin and an unsaturated butadiene- or isoprene-containing polymer capable of participating in cross-linking with the polybutadiene or polyisoprene resin during cure, and further wherein a volume to volume ratio of the polybutadiene or polyisoprene resin to the unsaturated butadiene- or isoprene-containing polymer is between 1:9 and 9:1, inclusive.

50. (Original) The component of Claim 49, wherein the conductive polybutadiene- or polyisoprene-based composite further comprises a functionalized liquid polybutadiene or polyisoprene resin.

51. (Previously Presented) The component of Claim 49, wherein the conductive polybutadiene- or polyisoprene-based composite comprises, based on a total volume of the composite, about 10 volume % to about 90 volume % of the electrically conductive filler.

52. (Original) The component of Claim 49, wherein the filler is synthetic graphite.

53. (Previously Presented) The component of Claim 49, wherein the conductive polybutadiene- or polyisoprene-based composite further comprises at least one monomer with vinyl unsaturation.

54. (Original) The component of Claim 53, wherein the at least one monomer with vinyl unsaturation is selected from the group consisting of styrene, vinyl toluene, divinyl benzene, triallylcyanurate, diallylphthalate, and multifunctional acrylate monomers.

55. (Original) The component of Claim 49, wherein the unsaturated butadiene- or isoprene-containing polymer is a copolymer of isoprene or butadiene and a second monomer.

56. (Original) The component of Claim 55, wherein the unsaturated butadiene- or isoprene-containing copolymer is solid.

57. (Original) The component of Claim 55, wherein the unsaturated butadiene- or isoprene-containing polymer is a block copolymer.

58. (Original) The component of Claim 57, wherein the unsaturated butadiene- or isoprene-containing polymer is a styrene-butadiene or a methyl butadiene-butadiene di-block polymer.

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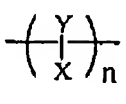
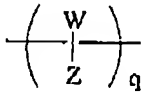
59. (Previously Presented) The component of Claim 57, wherein the unsaturated butadiene- or isoprene-containing polymer is a thermoplastic elastomer block copolymer having one of the formula

$X_m(Y\text{-}X)_n$,  , $W_p\text{-}(Z\text{-}W)_q$, or 

wherein in each formula Y is a block comprising isoprene or butadiene units; X is a thermoplastic block; m and n represent the average block numbers in the copolymer, m being 0 or 1, and n being at least 1; Z is a polyethylene or ethylene-propylene copolymer block; W is a thermoplastic block; and p and q represent the average block members in said copolymer, p being 0 or 1, and q being at least 1.

60. (Previously Presented) The component of Claim 45, wherein the conductive polymer composite comprises an epoxidized phenol novolac resin, an epoxidized cresol novolac resin, a poly(diallyl phthalate), and combinations comprising at least one of the foregoing resins.

61. (Previously Presented) An electrochemical cell component comprising:

an electrically and thermally conductive core comprising an active area and a heat transfer area extending beyond the active area; and

an electrically and thermally conductive polybutadiene- or polyisoprene-based composite substantially covering and adhered to the active area of the conductive core by an adhesion promoter, wherein the conductive polybutadiene- or polyisoprene-based composite, when molded, has a linear shrinkage per unit length of the molded conductive polymer composite in the X-Y plane of less than or equal to about 0.005.

62. (Currently Amended) An electrochemical cell component comprising:

an electrically and thermally conductive core comprising an active area and a heat transfer area extending beyond the active area; and

an electrically and thermally conductive polybutadiene- or polyisoprene-based composite substantially covering and adhered to the active area of the conductive core by an adhesion promoter but not covering the heat transfer area, wherein the polymer composite comprises an electrically conductive filler in the form of fibers, platelets, or a combination of fibers and platelets.

63. (Previously presented) An electrochemical cell component comprising:

a conductive core comprising a first side and a second side, wherein the first side comprises a first active area and a heat transfer area extending beyond the active area; and

a first electrically and thermally conductive polymeric composite substantially covering the first active area, wherein the first composite is molded to form a first channel.

64. (Previously Presented) The component of Claim 63, wherein the second side has a second active area substantially covered by a second electrically and thermally conductive polymeric composite molded to form a second channel.

65. (Previously Presented) The component of Claim 64, wherein the first, second, or first and second polymeric composite is adhered to the conductive core by an adhesion promoter.

66. (Previously Presented) The component of Claim 63, wherein the first conductive polymeric composite comprises an electrically conductive filler selected from the group consisting of conductive metals, particles coated with conductive metals, carbon, and mixtures containing at least one of the foregoing fillers.

67. (Previously Presented) The component of Claim 66, wherein the electrically conductive filler comprises particles in the form of fibers, platelets, or a combination of fibers and platelets.

68. (Previously Presented) The component of Claim 63, wherein the conductive core has a thermal conductivity of at least about 5 watts/meter °K.

69. (Previously Presented) The component of Claim 63, wherein the first conductive polymeric composite has a linear shrinkage per unit length of the first molded composite in the X-Y plane of less than or equal to about 0.005.

70. (Previously Presented) The component of Claim 63, wherein the conductive core comprises metals selected from the group consisting of aluminum, aluminum alloys, nickel, nickel alloys, copper, platinum, magnesium, magnesium alloys, titanium, gold plated metals, and stainless steel.

71. (Previously Presented) The component of Claim 63, wherein the first conductive polymeric composite comprises polybutadiene or polyisoprene.

72. (Previously Presented) The component of Claim 63, wherein the first conductive polymeric composite comprises a thermosetting polybutadiene or polyisoprene resin and an unsaturated butadiene- or isoprene-containing polymer capable of participating in cross-linking with the polybutadiene or polyisoprene resin during cure, and further wherein a volume to volume ratio of the polybutadiene or polyisoprene resin to the unsaturated butadiene- or isoprene-containing polymer is between 1:9 and 9:1, inclusive.

73. (Previously Presented) The component of Claim 72, wherein the first conductive polymeric composite further comprises about 10 to about 90 volume % of an electrically conductive filler, based on the total volume of the first conductive polymeric composite.

74. (Previously Presented) The component of Claim 73, wherein the filler comprises synthetic graphite.

75. (Previously Presented) The component of Claim 63, wherein the first conductive polymeric composite comprises an epoxidized phenol novolac resin, an epoxidized cresol novolac resin, a poly(diallyl phthalate), or combinations comprising at least one of the foregoing resins.

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76. (Previously Presented) A method of making an electrochemical cell component, the method comprising

coating an adhesion promoter on a conductive core comprising an active area, wherein a heat transfer area extends beyond the active area; and

molding an electrically and thermally conductive polymeric composite onto the core at least partly over the coated adhesion promoter to form a molded polymeric composite, wherein the molding further forms at least one channel in the molded polymeric composite.

77. (Previously Presented) An electrochemical cell component comprising

a conductive core comprising an active area and a heat transfer area extending beyond the active area;

a first electrically and thermally conductive polymeric composite substantially covering a first side of the active area; and

a channel formed in the first polymeric composite, the channel being non-conformal to the underlying active area.

78. (Previously Presented) The component of Claim 77, further comprising a second electrically and thermally conductive polymeric composite substantially covering a second side of the active area, and having at least one channel that is non-conformal to the underlying active area.

79. (Previously Presented) The component of Claim 78, wherein the first, second, or first and second polymeric composite is adhered to the conductive core by an adhesion promoter.

80. (Previously Presented) The component of Claim 77, wherein the first conductive polymeric composite comprises an electrically conductive filler selected from the group consisting of conductive metals, particles coated with conductive metals, carbon, and mixtures containing at least one of the foregoing fillers.

81. (Previously Presented) The component of Claim 80, wherein the conductive filler comprises particles in the form of fibers, platelets, or a combination of fibers and platelets.

82. (Previously Presented) The component of Claim 77, wherein the conductive core has a thermal conductivity of at least about 5 watts/meter °K.

83. (Previously Presented) The component of Claim 77, wherein the first conductive polymeric composite, when molded, has a linear shrinkage per unit length of the molded composite in the X-Y plane of less than or equal to about 0.005.

84. (Previously Presented) The component of Claim 77, wherein the conductive core comprises metals selected from the group consisting of aluminum, aluminum alloys, nickel, nickel alloys, copper, platinum, magnesium, magnesium alloys, titanium, gold plated metals, and stainless steel.

85. (Previously Presented) The component of Claim 77, wherein the first conductive polymeric composite comprises polybutadiene or polyisoprene.

86. (Previously Presented) The component of Claim 77, wherein the first conductive polymeric composite comprises a thermosetting polybutadiene or polyisoprene resin and an unsaturated butadiene- or isoprene-containing polymer capable of participating in cross-linking with the polybutadiene or polyisoprene resin during cure, and further wherein a volume to volume ratio of the polybutadiene or polyisoprene resin to the unsaturated butadiene- or isoprene-containing polymer is between 1:9 and 9:1, inclusive.

87. (Previously Presented) The component of Claim 86, wherein the first conductive polymeric composite further comprises about 10 to about 90 volume % of an electrically conductive filler, based on the total volume of the first polymeric composite.

88. (Previously Presented) The component of Claim 87, wherein the filler comprises synthetic graphite.

89. (Previously Presented) The component of Claim 77, wherein the first conductive polymeric composite comprises an epoxidized phenol novolac resin, an epoxidized cresol novolac resin, a poly(diallyl phthalate), or combinations comprising at least one of the foregoing resins.

90. (New) An apparatus comprising:

an electrochemical cell electrically conductive support comprising

an electrically and thermally conductive core having a first coefficient of thermal expansion, said core comprising an active area and a heat transfer area extending beyond the active area; and

an electrically and thermally conductive polymeric composite having a second coefficient of thermal expansion, said polymeric composite substantially covering the active area of the conductive core but not the heat transfer area,

wherein the first and second coefficients of thermal expansion are closely matched.